Super-Power As a Means of Solving Our Power Troubles

By DONALD A. NAFTZER, '29

The power consumption in the United States has increased twofold every nine years since 1900, and because of the adaptability and transmissability of electric power the demand for it is becoming greater.[1] It is estimated that the peak load in the Ohio and Pennsylvania territory will increase from 565,000 kw. in 1924 to 1,400,000 kw. by 1930, a gain of 50%.[1] In the northeastern section of the United States the estimate is that the power consumption will increase from 21,747,000,000 kw. hours in 1922 to 30,874,000,000 kw. hours by 1930, a gain of about 25%.[2] In his governmental report[2] on the survey of superpower in this country, Mr. W. S. Murray states that during the last 20 years the annual production of power by the public utilities has increased from 4,000,000,000 kw. to 50,000,000,000 kw., and the per capita increase in consumption has been from 60 to 500 kw. per year.

Most industries have realized the advantages of electric power, but in the last few years have suffered large losses from the lack of a large and reliable supply of power at times from municipal and industrial power plants because of an inadequate supply of fuel during these periods. These interruptions of the coal supply which are caused by railroad or mine disturbances are usually followed by a closing of the factory until the proper supply of fuel can be received.

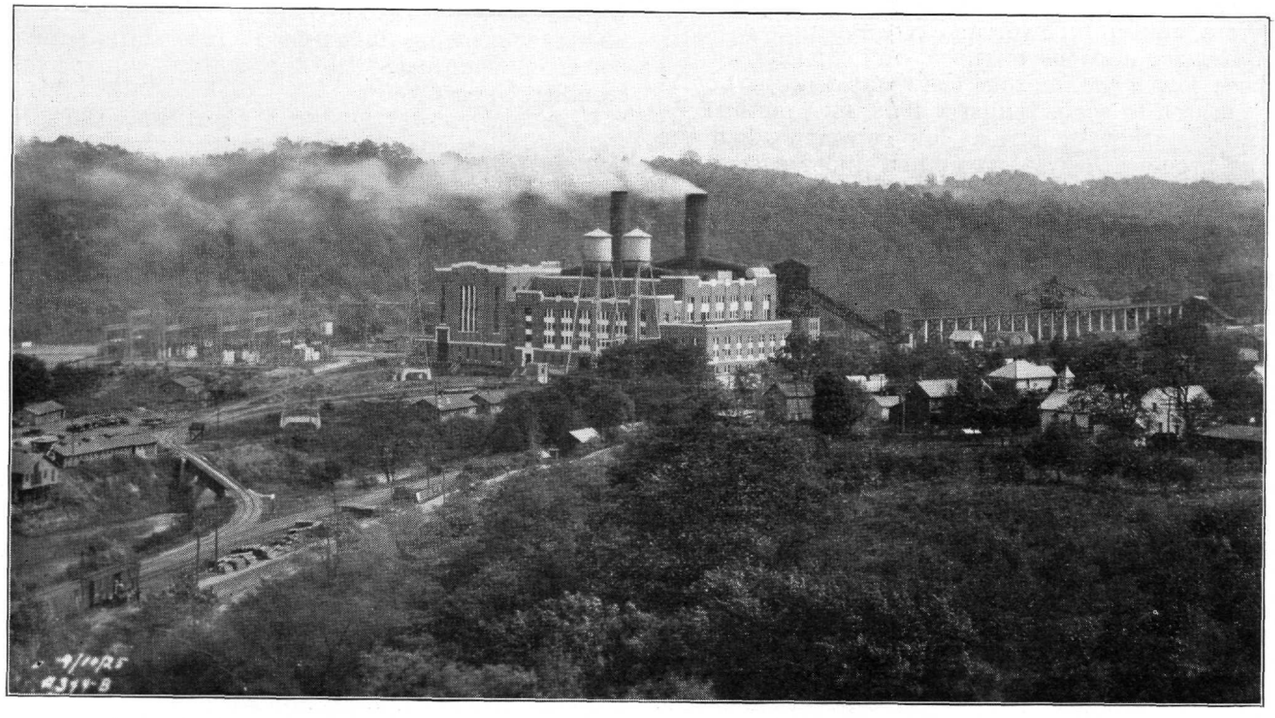
The interruption of the fuel supply is not the only interruption to the production of power, for it may be hampered by a breakdown in some of the machinery or equipment of the plant. Power plants do not usually reserve a stock of repairs or equipment, because the investment is too high, so the plant is compelled either to run at low capacity, or to shut down until the break is remedied.

Industry at present is carrying out its work on a large scale, and consequently demands a sufficient and continuous supply of power along with 100% service.

Agriculture, the main industry of this country, has been waiting for electric power to reach out and give it a helping hand, but has been to remote for the isolated stations to reach. There must be an extensive propagation of electric power into the rural districts to put agriculture on the same power basis as other industries, and to make it a more profitable industry.

Coal, the center of our power economics, is drawing the attention of the economists of this country, for it is being consumed at the rate of 500,000,000 tons annually.[1] They fear that at this rate the coal supply will last only one hundred years. Power alone utilizes 36% of the coal consumed per year.[1] How are we to check this rate so as to conserve the supply for the generation of power in the future?

Check the building of steam generating stations, and harness all available water power, because it is the most economical source of power.



General view of the Philo power plant, showing the switch and transformer yard on the extreme left, the plant in the center and the coal handling equipment and storage on the right.

This is a splendid idea; in fact, water power is being developed extensively at present, but it is estimated by surveyors' of the power industry that if all the available water power in this country was developed there would not be enough to meet the demand. There must be a more economical production of power to aid in the conservation of coal.

These are the troubles that confront the various economists, and foremost engineers of this country. The question now arises as to whether "superpower" will solve these power troubles, and is superpower being considered by these same economists and engineers. Although superpower and giant power have been confused, superpower in reality is a combination of giant power and interconnection. Giant power is the production of electric power in large quantities, and at a high potential. These centers of high power which supply a network of lines over a limited radius are called central stations. Interconnection is the connecting of these large centers of production to form a larger network of lines over a larger area, and to bring about a co-ordination of production of power.

To understand how superpower is to meet these demands of industry, we have only to review the functionings of the superpower systems adopted by different sections of this country.

One of the most typical superpower systems now in operation, and supplying power to 200 communities through 1200 miles of interconnected lines which covers an area of 24,000 square miles, is found in the state of Michigan. This system begins at the northwestern side of the state, comes down the west side, crosses the south end, and goes up the east side.

During certain seasons of the year the demand for power becomes greater or less according to the trend of industry than at other seasons, and it is a waste of power and consequently a waste of fuel for stations to run at full capacity during these low loads. From the facts that power is generated to serve industry it is not practical for power stations to run at low capacity when the load becomes heavy. Over and under production of power are eliminated by the regulation load system which is a characteristic of superpower.

The power production of the Michigan superpower system is fully controlled by the "dispatcher load system," with its central located at the city of Jackson. The central is under the supervision of an engineer called the dispatcher, who is provided with every means of communication to every station in the system, and with all the necessary instruments for determining the load of the system. When the load of the system becomes low or high, the dispatcher orders certain stations to lower or raise their production just enough to meet the demand. The dispatcher also watches the water mark of the hydro-electric plants, which produce 54% of the total power generated in that state. If the mark is high, he orders the hydro-electric plants to run at full capacity, and the steam stations at a lower capacity. If the mark is low, the production of the hydro-electric plants will be low, and the steam plants are called upon to take care of the load. Thus we see there is a seasonal saving of fuel by superpower.

In the state of California we have a superpower system that supplies a market consisting of mining, agriculture, municipal power and lighting load with two billion kilowatts annually, 30% of which is produced by hydro-electric plants. This system was of immense importance to agriculture in that state during the 1924 drought. For irrigation projects, the hydro-electric plants on the Sacramento and San Joaquin rivers were called upon to operate at their full capacities along with the steam stations in meeting the abnormal demand for power.

One of the greatest interstate superpower systems is found in the Pennsylvania, Ohio and New York territory, where at present is located 50% of the load of this country. Almost all of the large cities of this section are connected by transmission lines and are operating their local power plants at full capacity.

Over one-third of the coal produced in this country is used by steam locomotives in transporting the remaining two-thirds for the generation of power and other means. Superpower aims to locate power plants at the mouths of mines, and thus to obviate the necessity of transporting coal. Locating plants at the mouths of mines is not always feasible, because the accessibility to cooling water and labor has to be considered. In the state of Pennsylvania there are four power plants now operating at the mouths of mines. These plants, the Duquesne, Springdale, Colfax and Windsor plants, help to carry the load of the northern part of Pennsylvania, and of the southern part of New York state. In this way, superpower will save the nation annually 50,000,000 tons of coal, estimated at $500,000,000.

Thus we see the manner in which superpower is capable of handling the power situation in the United States, a nation of great power resources and ever-growing industries. Interstate superpower is the means to the end of our power troubles.

"The superpower system," says Hon. Herbert Hoover, "depends wholly upon the free flow of power between states, and this free flow of power rests upon the public policies expressed in national and state laws."

Bibliography

Superpower and Its Public Relations, H. Hoover, Military Engineer. Vol. 16, No. 88, July-Aug., '24.

Superpower, S. Q. Hayes. Industrial Management, Vol. 67, No. 136, March, '24.

Superpower and Coal Conservation. Literary Digest, Vol. 83, No. 6, May, '24.

Superpower and Interconnection, S. Q. Hayes. Electrical World, Vol. 21, No. 3, March, '24.

Operating a Superpower System, A. M. Perry. Electrical World, Vol. 86, No. 13, Oct. 26, '25.

Superpower and the California Drought. Literary Digest, Vol. 81, No. 16, Oct., '23.

Interconnection, Superpower and Electrification. Electrical Journal, Vo. 21, No. 3, May, '24.

How To Save 50,000,000 Tons of Coal Annually. Literary Digest, Vol. 82, No. 12, Aug., '24.

Chicago Superpower Development. Power, Vol. 63, No. 8, Feb. 23, '26.